Mushistonite $(Cu, Zn, Fe^{2+})Sn^{4+}(OH)_6$

Crystal Data: Cubic. *Point Group:* $4/m\ \overline{3}\ 2/m$. In fine-grained earthy aggregates.

Physical Properties: Hardness = 4–4.4 VHN = 240–254 D(meas.) = n.d. D(calc.) = n.d.

Optical Properties: Semitransparent. *Color:* Brownish green to malachite-green, yellow-brown; colorless in thin section; gray in reflected light. *Luster:* Vitreous. *Optical Class:* Isotropic. n = n.d.

Cell Data: *Space Group: Pn3m.* a = 7.705–7.735 Z = 4

X-ray Powder Pattern: Mushiston deposit, Tajikistan.
3.880 (100), 2.740 (50), 1.729 (35), 1.578 (23), 2.230 (20), 1.932 (16), 2.330 (13)

Chemistry:

	(1)	(2)
SnO_2	52.2	47.2
FeO	3.3	10.6
CuO	13.5	11.4
ZnO	11.1	7.0
Ag_2O	0.1	
H_2O	[19.1]	[23.6]
Total	[99.3]	[99.8]

(1) Mushiston deposit, Tajikistan; by electron microprobe, original analysis elemental, here converted to oxides, H_2O calculated from excess O given, $(OH)^{1-}$ confirmed by IR; corresponds to $(Cu_{0.48}Zn_{0.39}Fe_{0.13})_{\Sigma=1.00}Sn_{0.98}(OH)_{6.02}$. (2) Do.; corresponds to $(Cu_{0.48}Zn_{0.39}Fe_{0.17})_{\Sigma=1.04}Sn_{1.00}(OH)_{5.95}$.

Mineral Group: Schoenfliesite group.

Occurrence: In the oxidized zone of a tin deposit, replacing stannite (Mushiston deposit, Tajikistan); from a zoned pegmatite (Etta mine, South Dakota, USA).

Association: Stannite, chalcopyrite, sphalerite, galena (Mushiston deposit, Tajikistan); cassiterite, pseudomalachite, quartz (Etta mine, South Dakota, USA).

Distribution: In the Mushiston tin deposit, Kaznok Valley, Zeravshan Mountains, Tajikistan. From the Etta mine, near Keystone, Pennington Co., South Dakota, USA.

Name: For its occurrence in the Mushiston deposit, Tajikistan.

Type Material: Mining Institute, St. Petersburg, 1999/1; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 81069.

References: (1) Marshukova, N.K., A.B. Pavlovskii, and G.A. Sidorenko (1984) Mushistonite $(Cu, Zn, Fe)Sn(OH)_6$ – a new tin mineral. Zap. Vses. Mineral. Obshch., 113, 612–617 (in Russian). (2) (1985) Amer. Mineral., 70, 1331 (abs. ref. 1). (3) (1986) Mineral. Abs., 37, 98 (abs. ref. 1). (4) Marshukova, N.K., G.A. Sidorenko, and N.I. Chistyakova (1978) On natural hydrostannates. New data on minerals of the U.S.S.R., 27, 89–95 (in Russian). (5) (1980) Amer. Mineral., 65, 1069–1070 (abs. ref. 4). (6) Dunn, P.J. and W.L. Roberts (1986) Cuprocassiterite discredited as mushistonite; and an unnamed tin mineral from the Etta Mine. Mineral. Record, 17, 383.